

## Claims

[c1] 1. A detector assembly comprising:  
a collimator assembly comprising:  
a first collimator segment having a first left end and a  
first right end, said first collimator segment comprising:  
a plurality of first segment longitudinal walls having a  
first segment depth, each of said plurality of first seg-  
ment longitudinal walls including a first interlocking  
protrusion comprising only a portion of said first seg-  
ment depth;  
a second collimator segment having a second left end  
and a second right end, said second collimator segment  
comprising:  
a plurality of second segment longitudinal walls having a  
second segment depth, each of said plurality of second  
segment longitudinal walls including a second interlock-  
ing protrusion comprising only a portion of said second  
segment depth, each of said second interlocking protru-  
sions engaging one of said first interlocking protrusions  
to form a continuous sidewall segment.

[c2] 2. A detector assembly as described in claim 1, wherein  
said first interlocking protrusion comprises a block

shaped protrusion.

- [c3] 3. A detector assembly as described in claim 1, wherein said first interlocking protrusion comprises a triangular shaped protrusion.
- [c4] 4. A detector assembly as described in claim 1, wherein said plurality of first segment longitudinal walls comprise cast tungsten.
- [c5] 5. A detector assembly as described in claim 1, wherein said plurality of first segment longitudinal walls comprise cast lead.
- [c6] 6. A detector assembly as described in claim 1, further comprising:  
a plurality of first latitudinal segments positioned between each of said plurality of first longitudinal walls such that a plurality of first collimator chambers is formed, each of said first collimator chambers having a first collimator width.
- [c7] 7. A detector assembly as described in claim 6, wherein each of said first interlocking protrusions comprises a first protrusion width, said first protrusion width less than or equal to said first collimator width.
- [c8] 8. A detector assembly as described in claim 1, wherein:

said first collimator segment comprises a first collimator height;

said first interlocking protrusion comprising a first protrusion height;

said second interlocking protrusion comprising a second protrusion height; and

said first protrusion height added to said second protrusion height equaling said first collimator height.

[c9] 9. A detector assembly as described in claim 1, further comprising:

a scintillator assembly in communication with said collimator assembly, said scintillator assembly having a scintillator longitudinal width, said scintillator longitudinal width smaller than a collimator assembly longitudinal width.

[c10] 10. A detector assembly as described in claim 1, wherein said first collimator segment further comprises:

a plurality of opposing interlocking protrusions each of which is formed on one of said a plurality of first segment longitudinal walls, each of said plurality of opposing interlocking protrusions positioned opposite one of said first interlocking protrusions, said opposing interlocking protrusion comprising only a portion of said first segment depth.

- [c11] 11. A detector assembly as described in claim 10, wherein each of said opposing interlocking protrusions creates a mirror negative to one of said first interlocking protrusions.
- [c12] 12. A detector assembly as described in claim 6, wherein said plurality of first collimator chambers forms a rectangular array.
- [c13] 13. A collimator assembly segment for mating to a second collimator segment comprising a plurality of second segment longitudinal walls having a second segment depth, each of the plurality of second segment longitudinal walls having a second interlocking protrusion having a second protrusion height comprising only a portion of the second segment depth, comprising:
  - a first collimator segment having a first left end and a first right end, said first collimator segment comprising:
    - a plurality of first segment longitudinal walls having a first segment depth, each of said plurality of first segment longitudinal walls including a first interlocking protrusion comprising only a portion of said first segment depth, each of said first interlocking protrusions shaped to engage one of the second interlocking protrusions to form a continuous sidewall segment.
- [c14] 14. A collimator assembly segment as described in claim

13, further comprising:  
a plurality of first latitudinal segments positioned between each of said plurality of first longitudinal walls such that a plurality of first collimator chambers is formed, each of said first collimator chambers having a first collimator width.

- [c15] 15. A detector assembly as described in claim 14, wherein each of said first interlocking protrusions comprises a first protrusion width, said first protrusion width less than or equal to said first collimator width.
- [c16] 16. A detector assembly as described in claim 13, wherein:  
said first collimator segment comprises a first collimator height;  
said first interlocking protrusion comprising a first protrusion height;  
said first protrusion height added to the second protrusion height equaling said first collimator height.
- [c17] 17. A detector assembly as described in claim 13, wherein said first collimator segment further comprises:  
a plurality of opposing interlocking protrusions each of which is formed on one of said a plurality of first segment longitudinal walls, each of said plurality of opposing interlocking protrusions positioned opposite one of

said first interlocking protrusions, said opposing interlocking protrusion comprising only a portion of said first segment depth.

- [c18] 18. A detector assembly as described in claim 17, wherein each of said opposing interlocking protrusions creates a mirror negative to one of said first interlocking protrusions.
- [c19] 19. A method of manufacturing a detector assembly with extended longitudinal depth comprising:
  - casting a first collimator segment comprising a plurality of first segment longitudinal walls having a first segment depth, each of said plurality of first segment longitudinal walls including a first interlocking protrusion comprising only a portion of said first segment depth;
  - casting a second collimator segment comprising a plurality of second segment longitudinal walls having a second segment depth, each of said plurality of second segment longitudinal walls including a second interlocking protrusion comprising only a portion of said second segment depth;
  - engaging each of said second interlocking protrusions with one of said first interlocking protrusions to form a plurality of continuous sidewall segments.
- [c20] 20. A method of manufacturing a detector assembly, as

described in claim 19 further comprising:

casting a plurality of first latitudinal segments between each of said plurality of first longitudinal walls such that a plurality of first collimator chambers is formed, each of said first collimator chambers having a first collimator width; and

casting said first interlocking protrusions and said second interlocking protrusions such that each of said continuous sidewall segments equals said first collimator width.